



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,144	06/16/2005	Peter C Wait	101.0049	2275

50258 7590 12/07/2006

SENSOR HIGHWAY LIMITED  
GAMMA HOUSE, ENTERPRISE ROAD  
CHILWORTH SCIENCE PARK  
SOUTHAMPTON, HAMPSHIRE, 8016 7NS  
UNITED KINGDOM

EXAMINER

STAHL, MICHAEL J

ART UNIT PAPER NUMBER

2874

DATE MAILED: 12/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/539,144

Applicant(s)

WAIT ET AL.

Examiner

Mike Stahl

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 10-22, 24 and 27-34 is/are rejected.
- 7) ☒ Claim(s) 6, 8, 9, 23, 25 and 26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7, 10-12, 15-22, 24, 27-29, and 32-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishi et al. (US 5724126).

Claim 1: Nishi discloses a fiber optic sensing system comprising: an optical fiber 6 adapted to carry an optical signal from a starting location towards a remote location; the fiber adapted to transmit at least one information-carrying signal from the remote location towards the starting location; the information-carrying signal carrying information related to a parameter that is sensed in the remote location (the parameter in this case being the zero dispersion wavelength at that location of the fiber); the fiber operated in a region of negative chromatic dispersion; and the optical signal being at a power level sufficient to generate modulation instability if the fiber were operated in a region of positive chromatic dispersion. Fig. 23 shows the overall sensing system. The fiber 6 being investigated comprises three sections of fiber having different zero dispersion wavelengths (see fig. 24). The OTDR pulse is swept in wavelength. In the illustrated example, when the pulse wavelength is less than 1550 nm, it is lower than the zero dispersion wavelengths of all three sections of fiber (i.e., the entire fiber is operated in a region of negative chromatic dispersion). However, the power of the pulse is sufficient to generate modulation instability as shown in plot (2) of fig. 24. In that case the pulse wavelength is above 1550 nm

Art Unit: 2874

and generates modulation instability in section B of the fiber. Further description is provided at col. 20 ln. 28 – col. 21 ln. 23.

Claim 2: The system further includes an electro optical unit **10** connected to the fiber.

Claim 3: The unit extracts the information from the information-carrying signal.

Claim 4: The optical signal is subject to a level of modulation instability that does not inhibit a proper measurement of the information-carrying signal.

Claim 5: The optical signal is subject to a level of modulation instability that enables the proper measurement of the information-carrying signal.

Claim 7: The fiber transmits the information-carrying signal from a sensor. For example, section A of the fiber can be regarded as transmitting the information-carrying signal from section C of the fiber which is effectively the zero dispersion wavelength sensor for section C.

Claim 10: The fiber is adapted to sense the parameter.

Claim 11: It is considered inherent that the information-carrying signal comprises at least a small amount of Brillouin scattering. In a different embodiment, a pulsed DFB-LD is used so that its broadened output spectrum will inhibit stimulated Brillouin scattering (col. 14 lns. 6-11). No such provision is described for the fig. 23 embodiment, which does not use a separate pump laser.

Claim 12: The remote location may be a structure, in particular, whatever structure is being used to support the fiber.

Claim 15: The fiber described in Nishi is a dispersion shifted fiber since its sections all have zero dispersion wavelengths of at least 1550 nm (whereas non-dispersion shifted fiber

typically has a zero dispersion wavelength near 1300 nm). Dispersion shifted fiber is also mentioned at col. 21 lns. 32-40.

Claim 16: The fiber is operated at wavelengths shorter than the wavelength of zero dispersion (see e.g. fig. 24 case (1)).

Claim 17: It is considered inherent that the fiber is operated at wavelengths longer than the second mode cut-off wavelength, since the disclosed device is intended for use with high-speed transmission lines, i.e. ones which use wavelengths high enough for single mode operation (col. 2 lns. 24-31).

Claims 18-22, 24, 27-29, and 32-34: The process of operating the Nishi system described above involves all the recited method steps.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

Art Unit: 2874

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 13-14 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (applied above).

Claims 13 and 30: Nishi does not disclose the fiber being housed in a conduit. It was conventional at the time the invention was made to house optical fiber within an optical cable including a buffer tube (which may be regarded as a conduit). It would have been obvious to a skilled person to house the Nishi fiber within such an optical cable for the purpose of providing mechanical protection for the fiber.

Claims 14 and 31: In the manufacture of an optical cable including a buffer tube, the fiber must be fed into the buffer tube. This process may be regarded as pumping the fiber into the tube.

***Allowable Subject Matter***

Claims 6, 8-9, 23, and 25-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 6 and 23, Nishi does not disclose or suggest that the sensed parameter is any of the recited types. The Nishi device is directed to determining the zero dispersion wavelength at locations along a fiber. There is no apparent motivation to modify the Nishi device to measure anything else.

Art Unit: 2874

As to claims 8-9 and 25-26, Nishi does not disclose or suggest the recited types of sensors. The sensor is the fiber itself.

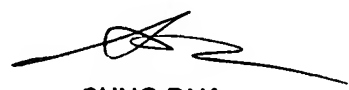
None of the prior art references of record disclose or suggest a system or method which satisfies all the aspects of claims 6, 8-9, 23, or 25-26.

### *Conclusion*

The additional references listed on the attached PTO-892 form are considered relevant to the subject matter of this application.

Inquiries about this letter should be directed to Mike Stahl at 571-272-2360. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official correspondence which is eligible for submission by facsimile and which pertains to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Questions about the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Stahl  
Patent Examiner  
Art Unit 2874  
December 3, 2006



SUNG PAK  
PRIMARY EXAMINER